W.P. SERIES NO. 251

MEASURING SOCIO-ECONOMIC GENDER INEQUALITY: TOWARDS AN ALTERNATIVE TO THE UNDP GENDER-RELATED DEVELOPMENT INDEX

A. Geske Dijkstra and Lucia C. Hanmer

The Institute of Social Studies is Europe's longest-established centre of higher education and research in development studies. Post-graduate teaching programmes range from six-week diploma courses to the PhD programme. Research at the ISS is fundamental in the sense of laying a scientific basis for the formulation of appropriate development policies. The academic work of the Institute is disseminated in the form of books, journal articles, teaching texts, monographs and working papers. The Working Paper series provides a forum for work in progress which seeks to elicit comments and generate discussion. The series includes the research of staff and visiting fellows, and outstanding research papers by graduate students.

For a list of available Working Papers and how to order them see the back of this Working Paper.

For further information contact:
Publications Office - **Institute of Social Studies** - P.O. Box 29776
2502LT The Hague - The Netherlands - FAX: +31 70 4260799
e-mail **#publication_dept@iss.nl** (Attn: Publications Assistant)

TABLE OF CONTENTS

MEASURING SOCIO-ECONOMIC GENDER INEQUALITY: TOWARDS AN ALTERNATIVE TO THE UNDP GDI

A. Geske Dijkstra and Lucia C. Hanmer[1]

ABSTRACT

This paper assesses UNDP's Gender-Related Development Index (GDI). It concludes that the GDI suffers from several limitations. The GDI is to a large extent based on the HDI (Human Development Index). It attempts to incorporate a measure of gender equity into a measure of absolute levels of human development. This paper argues that a separate measure of gender inequality is needed, in order to increase both its policy and its theoretical relevance. A separate measure of gender inequality will also improve its validity, since the indicators used for the HDI, and thus for the GDI, are shown not to be the most appropriate for measuring gender inequality. The second part of the paper develops a conceptual framework that can form the basis for an alternative measure.

1. INTRODUCTION

The UNDP *Human Development Report, 1995* (hereafter referred to as UNDP 1995) presents the Gender-Related Development Index (GDI). The aim of the GDI is to rank countries according to both their absolute level of human development, and their relative scores on a gender equality index. The GDI uses the same dimensions and indicators as the Human Development Index (HDI): income; health as measured by life expectancy at birth; and, a composite indicator for education, including the literacy rate and a combined school enrolment ratio. The average scores on each of these indicators are then adjusted for gender inequality. This means the GDI focuses on socio-economic inequality. Another measure presented in UNDP (1995), the Gender Empowerment Measure (GEM), provides a measure of the extent of inequality in political and social power. This paper deals with socio-economic aspects of gender inequality only; it assesses the value of UNDP's GDI and explores alternative ways to measure socio-economic gender inequality.

The HDI has generated an extensive academic discussion. This discussion focuses on:

- the *relevance (theoretical, and policy relevance)* of the index;
- the *validity* of the index: are the dimensions and variables used relevant for measuring human development? Does the index apply correct weights for the different indicators?
- the *reliability* of the data used in constructing the index.

UNDP (1995: 119-24) summarizes some aspects of the debate. With respect to the policy relevance, it argues that the publication of the HDI stimulated more attention to human development in many countries. As far as theoretical relevance is concerned, the HDI contributed to renewed interest in the relation between human development and growth. Publications in the area of the new growth theory stress the importance of health, education and skills for economic growth.

For the GDI, the questions of relevance, validity and reliability must also be addressed. Leaving the validity and reliability until the following sections, we discuss relevance here. With respect to policy relevance, publishing an indicator of gender inequality may enhance governments' attention to gender inequality and policies to reduce it. We can also expect it to become an input into theoretical debates concerning the existence and nature of the relationship between gender equality and macroeconomic growth, including the question of whether greater gender equity can enhance growth and development.

In view of the potential practical and theoretical relevance of a socio-economic gender inequality measure, it should be defined so that it:

- identifies the extent of gender inequality;
- identifies the causes of gender inequality, with a view to suggesting policies for reducing inequality; and,
- can be used to monitor the impact of these policies over time.

In this paper, we analyse the extent to which UNDP's GDI meets these aims, and we explore the potential for an alternative and better GDI in view of these objectives. We argue that there is a need for an index of gender inequality, regardless of absolute levels of human development. The paper originated as a contribution to a Workshop on GDI/GEM Indicators, sponsored by the Gender Desk of the Directorate General for Institutional Cooperation of the Ministry of Foreign Affairs of the Netherlands. The aim of the Workshop was to elaborate research proposals for assessing GDI and GEM for the four countries involved in the three bilateral Sustainable Development Agreements with The Netherlands: Benin, Bhutan, Costa Rica and The Netherlands.

The paper proceeds as follows. In section 2 we discuss in more detail how UNDP's GDI is constructed and what the strengths and limitations of this index are. Since the research project for which this paper was written will examine the usefulness of the GDI for Benin, Bhutan, Costa Rica, and the Netherlands, in particular, some remarks on the scores of these countries are made. In section 3, we develop an alternative conceptual framework for measuring socio-economic gender equality, examining possible relevant dimensions and variables and setting out causal relationships between them. Section 4 concludes.

2. THE GENDER-RELATED DEVELOPMENT INDEX OF UNDP

The addition of a Gender-Related Development Index (GDI) to the Human Development Index (HDI) reflects recent attempts to address one important aspect of the previously neglected distributional issues in development (UNDP 1995). UNDP starts from the premise that societies have some preference for gender equality. Improvements in female achievements are given more weight than improvements in male achievements given females are at a lower average level in the first instance (UNDP 1995). Following Anand and Sen (1995) we detail below the construction of the index used by the UNDP to calculate the GDI[2].

Anand and Sen start by noting that the social valuation given to achievements measured by various indicators (life expectancy, literacy or average earnings, for example) can vary according to the weight given to each of the components of the index. Suppose X indicates the proportion of the population that is literate and $X_{m,f}$ shows the proportion of the literate female and male population respectively. As long as X_m and X_f are not the same, different *social values* can be given to X according to how X_m and X_f are averaged. A simple arithmetic average gives:

$$\bar{X}=\frac{(n_f X_f+n_m X_m)}{(n_f+n_m)} \qquad (1)$$

where $n_{f,m}$ are the proportions of females, males in the total population.

But a pair of female and male achievements, X_f and X_m, does not have to be given the value of the arithmetic mean. If society is concerned about inequality then the social value it gives to the total achievement represented by literacy scores of 10% for women and 70% for men (arithmetic mean 40% assuming equal shares in population of men and women) should be lower than the social value it gives to the total achievement represented by literacy scores of 40% for men and women (arithmetic mean 40% with equal population shares). Anand and Sen calculate an "equally distributed equivalent achievement indicator", X_{ede} where the average of X_f and X_m is given by what they call a $(1-\epsilon)$ average.

Formally, X_{ede} is given by:

(2)

where $p_{f,m}$ are the population proportions of males and females respectively.

$$X_{ede}=\frac{(n_f X_f^{1-\epsilon}+n_m X_m^{1-\epsilon})^{\frac{1}{1-\epsilon}}}{(n_f+n_m)^{\frac{1}{1-\epsilon}}}$$
$$=(p_f X_f^{1-\epsilon}+p_m X_m^{1-\epsilon})^{\frac{1}{1-\epsilon}}$$

Equation 2 is used to calculate X_{ede} for different values of epsilon. However a special case occurs when epsilon is set equal to one when,

$$\log(X_{ede})=p_f \log X_f+p_m \log X_m \quad (3)$$

Setting ϵ at different values results in different weights being attributed to the degree of inequality between X_f and X_m. If,

- $\epsilon = 0$ X_{ede} equals the arithmetic mean
- $\epsilon = 1$ X_{ede} equals the geometric mean
- $\epsilon = 2$ X_{ede} equals the harmonic mean
- $\epsilon \rightarrow \infty$ X_{ede} tends to the value of the lower achievement.

Table 1. The Effect of Varying Epsilon on the Social Value given to Unequal Male and Female Achievement.

Initial Values				
X_f	5			
X_m	10			
p_f	0.50			
p_m	0.50			
Epsilon	0	1	2	∞
X_{ede}	7.5	7.07	6.67	5

Consider the following example that illustrates the effect that different values of epsilon have on the social valuation given to two different achievements. Suppose that the proportion of males and females in the population is equal. Table 1 illustrates the effects of different values of epsilon on the X_{ede} given that the achievement rate for some indicator, say literacy, is 5% for females and 10% for males.

The bottom half of the table shows that as epsilon is given higher values the social value given to the highest of the two achievements decreases. In the extreme as epsilon approaches infinity the value of X_{ede}tends to that of the group that achieves least, in our example women. Giving epsilon a value of infinity is thus akin to a social welfare function that measures society's progress according to the welfare of the poorest or most disadvantaged citizens.

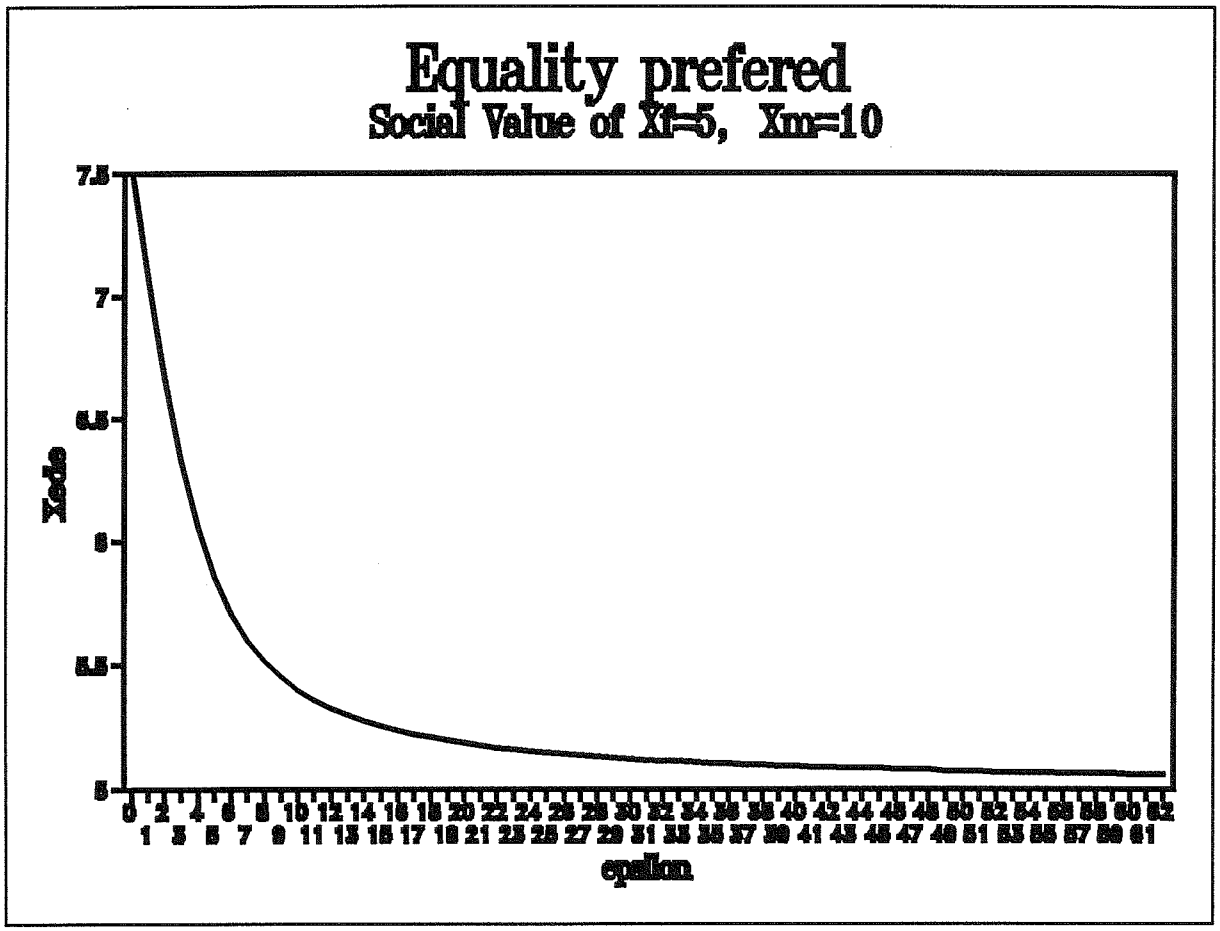


Figure 1

Figure 1 shows a graph of the function given by equation (2) using the values stated in table 1. It is titled equality preferred as epsilon is graphed only for positive values. It shows that the mathematical properties of the function mean that the extent to which the social valuation given to the X_{ede} changes diminishes as epsilon gets larger. Hence setting epsilon to be 2 rather that 1 creates a large difference in the social value given to our literacy scores whereas setting epsilon at 30 or 40 has little effect on their resulting social valuation.

UNDP's GDI uses the same indicators (or achievements following the terminology above) as the HDI viz. life expectancy, income and educational attainment, with these indicators disaggregated for males and females. The female share in earned income is computed by multiplying the ratio of the female wage to the average wage by the share of women in total

employment. With full equality, it should be 1 (or 100%).[3] The HDI figure for average GDP per capita is adjusted downwards (see UNDP 1995: 130-131 for greater detail). The combined school enrolment ratios for males and females enters the GDI index in exactly the same way as the total combined school enrolment ratio in the HDI. For life expectancy an adjustment is made for the fact that women live longer than men. The measure of life expectancy used in the HDI is calculated on the basis of fixed minimum and maximum values (as are income and education).[4] A minimum value of 25 years and a maximum value of 85 years are used for life expectancy in the HDI. In the GDI a minimum value of 22.5 is used for male life expectancy whereas for female life expectancy a minimum value of 27.5 is used (see UNDP 1995: 132 for greater detail).

An equally distributed index (X_{ede}) is then constructed for each of the three components of the GDI, using the formula shown by equation (2) with epsilon set at 2. Finally the resulting X_{ede}s for each indicator are summed into a single index with each element accorded equal weight.

By setting epsilon at 2 the HDI has chosen to select a strong social preference for gender equality. It is not however the maximum value that the preference for equality could take, which is that of the Rawlsian maxim, which judges social progress entirely by the extent to which the situation of the worst-off group improves, which in the case of gender may typically refer to women (Anand and Sen 1995). Despite the relative modesty of the assumed preference for equality, the GDI changes the HDI rankings in the majority of countries and in 20 countries rankings are changed by 10 to 26 places (see Table 2). UNDP (1995) also concludes that no country treats its women as well as its men, gender equality does not depend on the level of income of a society and that significant progress has occurred over the last two decades.

Of the four countries Benin, Bhutan, Costa Rica and The Neterlands, UNDP (1995) only includes GDIs for the latter three countries. What differerence then would setting a higher epsilon make to the GDI scores of these countries? Table 3 shows the range that the GDI could take according to the level of epsilon. Table 3 shows that for Costa Rica and the Netherlands using the geometric mean instead of the arithmetic reduces the GDI by about 9 and 13 percentage points, respectively. The difference between the arithmetic and geometric means is less marked for Benin, equalling about 3%. The values shown in the column where epsilon equals infinity show the GDI score when social preference for equity is at its maximum. Again the greatest differnce between this strong equity preference and the arithmetic average is shown for Costa Rica, followed by the Netherlands. There is least differenence in the case of Benin.

Table 2. Comparison of HDI and GDI ranks, 1992

Country	HDI	GDI	HDI-GDI
Greatest improvement			
Poland	43	22	+21
Humgary	42	23	+19
Slovakia	33	16	+17
Czech Rep	31	15	+16
Latvia	40	24	+16
Russian Federation	44	29	+15
Thailand	48	33	+15
Estonia	35	21	+14
Jamaica	66	52	+14
Lithuania	56	44	+12
Greatest fall			
Spain	8	34	-26
United Arab Emirates	37	57	-26
Bahrain	36	56	-20
Saudi Arabia	61	81	-20
Algeria	64	83	-19
Costa Rica	24	42	-18
Yemen	98	116	-18
Libya	58	75	-17
Netherlands	4	20	-16
Egypt	75	91	-16

Source: UNDP 1995, p. 78.

Table 3. Sensitivity of the GDI to different values of epsilon

Epsilon	0	1	2	5	10	100	∞
Netherlands	0.92	0.87	0.83	0.78	0.76	0.75	0.75
Costa Rica	0.84	0.77	0.71	0.66	0.64	0.63	0.63
Benin	0.57	0.55	0.54	0.51	0.48	0.46	0.45

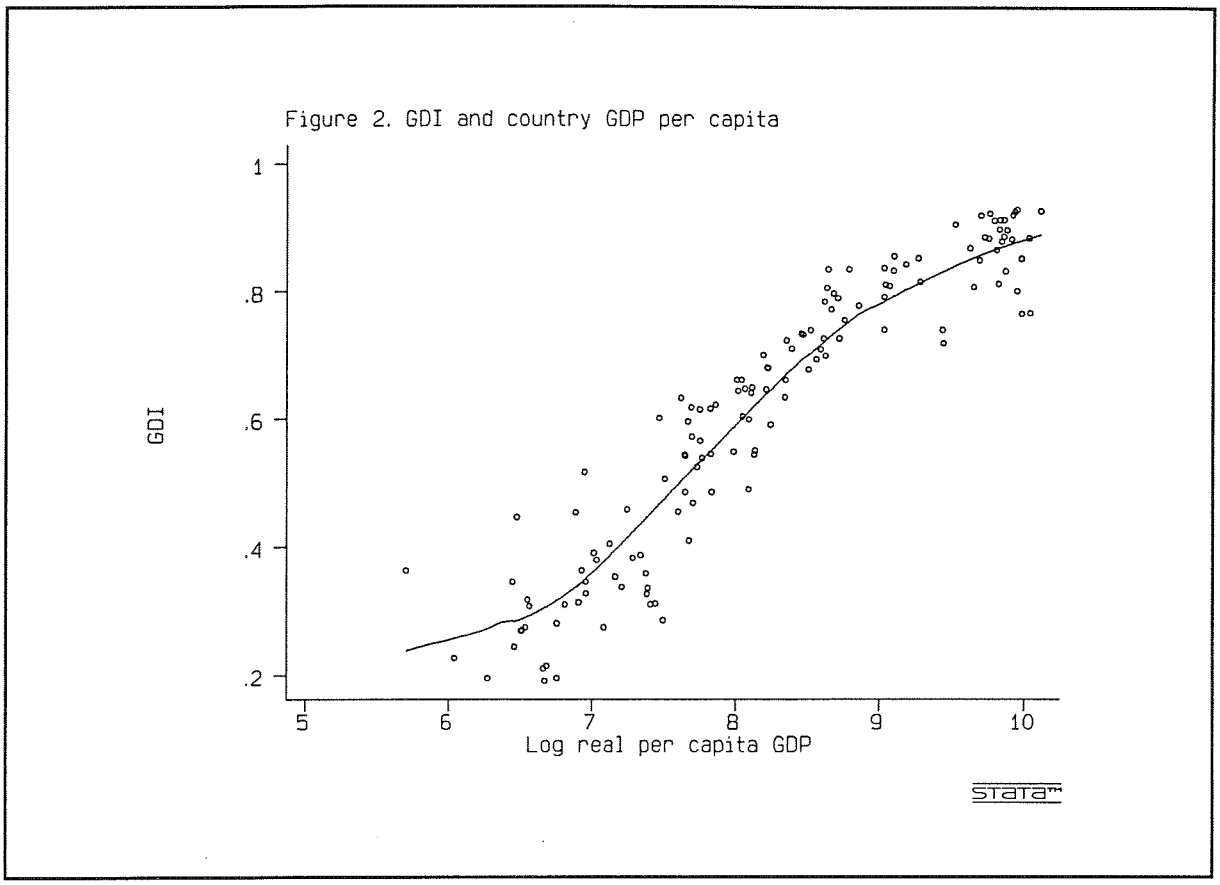
Note: Values may differ from calculations made by UNDP due to rounding.

The GDI and income per capita

Ideally, the GDI should be a relevant measure of socio-economic gender inequality. It should point government's attention to gender inequity, and it should stimulate research on the relationship between gender equality and general welfare. One relevant question to ask of the GDI is, hence, what does it tell us about a country's level of development that per capita GDP does not? In order to assess this, we compared the GDI scores of the countries with their GDP per capita. When the results for all 135 countries for which the GDI can be calculated are considered, the effect of including gender equality in a development measure makes little difference to the overall ranking of countries on the basis of income per capita. The GDI turns out to be highly correlated to per capita income, implying in the vast majority of cases that gender equity, as reflected by the GDI, will increase as countries get rich.

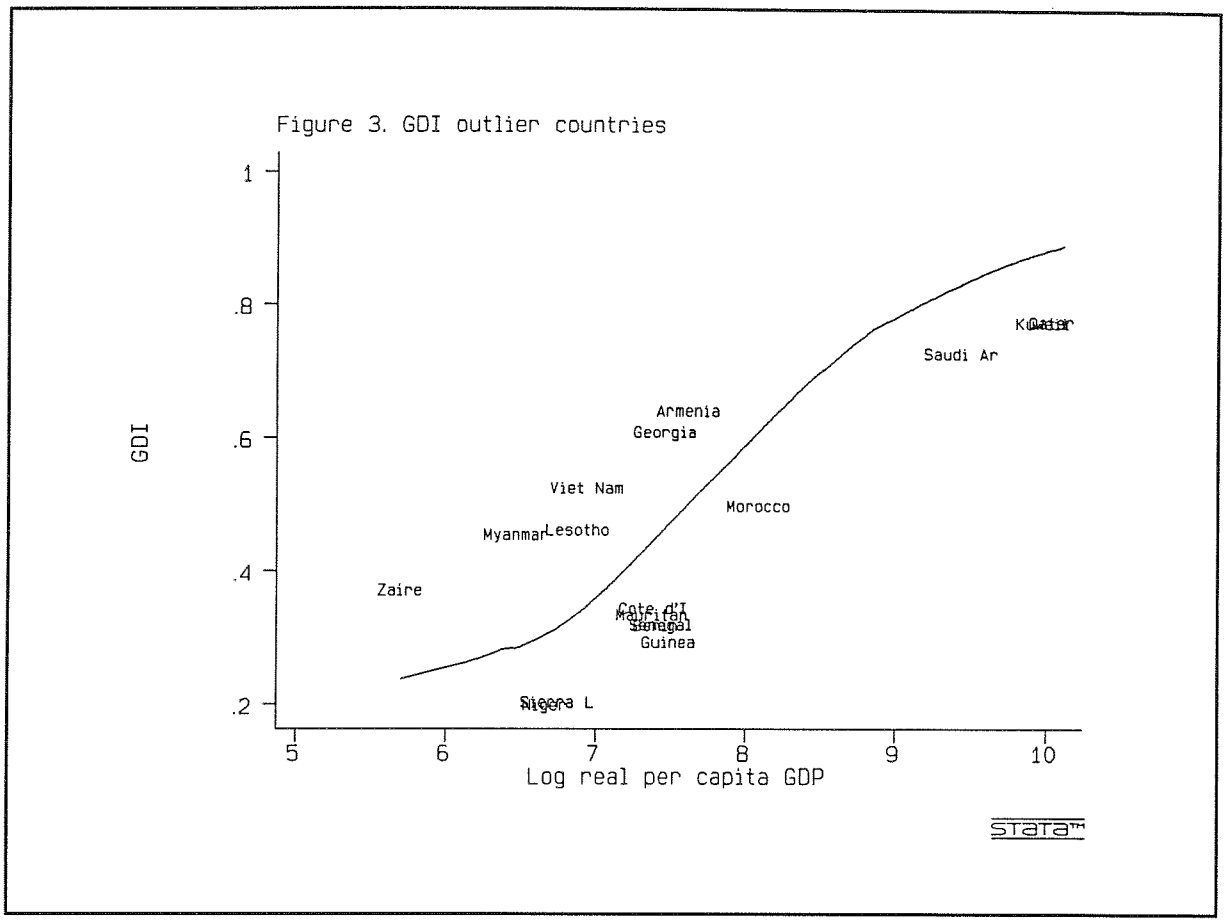
Figure 2 shows a scatter plot of GDI against the natural log of real (PPP) GDP per capita for 137 developing countries. The scatter suggests a non linear relationship between GDI and log GDP. A nonparametric regression technique, locally weighted scatterplot smoothing (lowess) was used to produce the regression line shown in Figure 2.

Although no data are available to compute a GDI for Bhutan, we can estimate it on the basis of the lowess regression results. Setting a confidence interval of 95% and using the coefficents from the regression above, it is predicted that Bhutan (GDP per capita $750) will have a GDI score of between 0.27 and 0.33. This shows, again, that a country with a low level of income per capita tends to have a low score on the GDI. In the case of Bhutan, it may however be misleading to assume a high degree of correlation between gender equality and per capita GDP. Evidence suggests that gender equity in Bhutan may be high in comparison to many other low income countries and some high income countries too. Women are not discriminated against by the laws that govern inheritance, land and marriage and are treated as legal equals. In agriculture, the gender division of labour is highly flexible with many tasks fully shared, including livestock rearing, fuel wood and water fetching. Girls account for 43% of the total school enrolment and the life expectancy at birth for women and men is about 66 years (Zhangmo and Kharga 1997).



Although most of the countries shown in the scatter plot in Figure 2 lie close to the regression line a few are a long way above it and several more lie well below the line. These countries are thus outlier points in the regression; their performance on gender equity is not what would be expected given their level of per capita GDP. Figure 3 shows the same regression with the only the outlier countries plotted. Outliers from the lowess regression were defined as having a residual (i.e. the difference between the actual and predicted GDI score) with an absolute value 1.5 standard errors greater than the mean residual.

Table 4 lists the outliers shown in Figure 3. If a more stringent definition of an outlier is used, e.g. residuals two standard errors greater than the mean residual, then only six countries are outliers.[5] The nonlinear regression specified hence "fits" the data well. The functional form is itself interesting. Figure 2 suggests that at low levels of development incremental increases in per capita GDP result in only small improvements in the GDI. Above a certain level of per capita GDP (approximately $665) GDI improves more rapidly with increases in per capita income. However as countries get richer (GDP per capita greater than approximately $4900) the responsiveness of the GDI to increases in per GDP decreases. Our results thus suggest that there is a level of per capita GDP which has to be reached before countries can make rapid improvements in GDI; that there is a GDI "take off point".



Intuitively this could be explained by certain levels of development being associated with greatly improved access to education and health services for girls and boys because, for example, of improved rural infrastructure and greater market penetration and monetisation in rural areas. It is also possible that changes in family size and women's fertility could be associated with the GDI take off point.

However policies and country specific social, political and cultural characteristics play a role in determining the extent of GDI "take off" in any particular country. There is thus no particular reason why outlier countries should have unique common characteristics. While it is not surprising that the former centrally planned economies (CPEs) Viet Nam, Armenia and Georgia have GDI scores higher than their level of GDP per capita would predict, good GDI performance cannot be said to be a characteristic of the former CPEs. The vast majority of former CPEs are not especially good GDI performers. Similarly one suspects that Myanmar and Zaire appear as outliers as their national income accounts severely underestimate their GDP per capita. Again it is not surpring that the Arab states Kuwait, Saudi Arabia and Qatar have lower GDI scores than their level of per capita GDP predicts, however not all Arab states have low GDIs, thus a poor GDI score is not a characteristic of Arab states.

Table 4. Outliers in gender development

Good Performers	Bad Performers
Armenia, Georgia, Vietnam, Lesotho, Myanmar, Zaire	Qatar, Kuwait, Saudi Arabia, Cote d'Ivoire, Mauritania, Morocco, Senegal, Benin, Guinea, Burkino Faso, Sierra Leone, Niger.

The relevance of the GDI

One conclusion we can draw from the discussion of the GDI above is that it only gives a limited amount of new information about progress in development. Although country rankings differ when the GDI or HDI is used rather than an income criterion alone (such as per capita GDP), the level of gender equity is substantially 'explained' by a country's level of income. There are two possible interpretations of this result. Either it implies that (in most cases) if economic growth is taken care of gender equity will improve, or it means that the gender development index does not capture crucial dimensions of gender inequity accurately. We favour the latter argument.

The first reason is the close relationship between the HDI and the GDI. In both indicators, income per capita plays an important role. As the HDI is strongly postively correlated to GDP per capita (Pyatt 1992), **the GDI will be too**. As long as absolute levels of socio-economic well-being are taken into account, as UNDP does in its GDI, it is necessary to assess "... the comparative claims of more relative equality against higher absolute achievements." (Anand and Sen 1995: 4). In our view, a GDI should not assess these relative claims (by choosing an appropriate ϵ), but should measure gender inequality *as such*.

Although we agree that the absolute level of well-being matters, we think it is important to have a separate measure of gender inequality, for both practical and theoretical reasons. Whatever the absolute level of human development, a high gender inequality in welfare is an ethical problem and should concern government. Theoretically, the study of the relationship between gender equity and general welfare can only be stimulated if a measure of gender inequality *as such* is available. The empirical research carried out so far has shown that socio-economic gender inequality reduces total welfare, both through the waste of resources and inefficiency inherent in not using the capacity of approximately half the population, and by inappropriate economic policies.[6] So we think that a better GDI can be constructed by looking at absolute levels of gender inequality.

The second reason why UNDP's GDI does not capture all relevant aspects of socio-economic gender inequality lies in the choice of indicators and the way these indicators are measured. This is the issue of the *validity* of the GDI. To this issue we now turn.

The validity of the GDI

The HDI and the GDI are comprised of exactly the same indicators. However, indicators that may be appropriate for measuring absolute levels of human development, are not necessarily most appropriate for measuring gender equality or inequality. We consider income, health and educaiton in turn.

UNDP data showing women's share of earned income are based on the male female difference in *urban wages*. They do not take into account rural wages, nor the intra-household income distribution, as UNDP acknowledges (UNDP 1995: 75). 'Urban wages' also exclude wages and incomes from the informal sector and income from subsistence activities. Even so, data on average male and female wages in the formal sector were only available for 55 countries. The average relative female wage (75%) was then applied for the other 130 countries (UNDP 1995: 130). So, for most countries, the female/male wage difference was simply assumed. As a result, the validity of the outcome is hampered, but the direction of the bias is difficult to assess. We tend to believe, however, that male/female wage differences will be larger in the rural and informal sectors than in the urban formal sector, so that the female share in earned income will be overestimated. The next step in the computation involves the multiplication of this relative female wage by the female share in employment (see above). But in fact, because data on this female share in employment were also lacking, data on the male/female share in the economically active population were used. However, data on the female share in the economically active population are severely influenced by institutional characteristics of the labour market and by measurement problems. In most countries, women work relatively more (than men) in the informal sector, and more as unpaid second worker in the ventures of "self-employed" persons (their husbands). Workers in these activities are more likely not to be included in the "economically active population", although the result of their activities is generally counted as part of GDP in the national accounts. This limited coverage will probably result in an underestimation of the female share in earned income. A third bias evolves from the neglect of the intra-household income distribution. In many countries, women have less control of household income and so less actual disposable income, even if they earn the income themselves. This neglect leads to overestimation of the female share in income.

For health, UNDP uses data on life expectancy at birth for the GDI. We would argue that data on infant and child mortality could be better indicators for measuring gender inequality

in health. In evaluating the debate on the HDI, UNDP states that there is an almost perfect correlation between life expectancy and infant mortality and that for that reason, the latter does not need to be included (1995: 121). Although this correlation may be the outcome of cross-country comparisons, and can be explained from the fact that infant and child mortality rates are important components of life expectancy, there may also be differences, especially if health conditions are changing. Infant and child mortality rates are flow variables that react immediately to changing conditions, while life expectancy is a stock variable and it will take longer before it reflects changing conditions. Sex specific differences in infant and child mortality rates can thus directly reflect the different values attached in society to male and female human beings. Hence, for our purposes, sex specific infant and child mortality rates may also be important indicators in their own right for measuring gender inequality. They can reflect the different values attached in society to the birth of a female or a male baby.

For education, the GDI uses a combination of the relative adult female literacy ratio and a combined primary, secondary and tertiary school enrolment ratio. This indicator is relevant, and data are available for most countries. However, the access to education in quantitative terms does not tell us much about the 'product' of education: the increase of cognitive and other skills. The *quality* of education is also important. Indicators for this can be number of pupils per teacher, drop-out rates and repetition rates.

Time use studies are reported in chapter 4 of UNDP (1995). This chapter reports studies in a sample of 31 countries, and documents the higher workload for women if paid and non-paid activities are counted. As UNDP (1995: 91) states, "*a higher workload leads to less leisure and even less sleep. Conventional measures of well-being, ..., neglect this debilitating aspect of intense work. A human development perspective cannot afford to overlook it.*" However, time use data are not included in the GDI, probably because they are not available for all countries.

Annex 1 summarizes the sources of data used in UNDP (1995) with respect to indicators relevant for measuring socio-economic gender inequality. It also shows that availability of data for Benin, Costa Rica and The Netherlands; for Bhutan no figures were presented in UNDP (1995).

Conclusion

We conclude that UNDP's GDI is a useful first step for assessing socio-economic gender inequality. It applies a rather strong gender equality preference. However, the relevance of this Gender-Related Development Index as a measure of gender inequality is limited because absolute levels of human development play such a large role in it. As a result, there proved to be a close correlation between the GDI and the level of income per capita. The validity of the GDI also has limitations, in particular with regard to the way the female share in income is measured.

3. AN ALTERNATIVE FRAMEWORK FOR MEASURING SOCIO-ECONOMIC GENDER INEQUALITY

Gender inequality in well-being manifests itself in many forms. Empirical evidence shows men earn more than women. Women have less access to assets such as land, natural resources and other physical assets, education, technology and credit. They also experience an unequal "burden", i.e. a higher workload, although the major part of this workload is invisible in economic accounts. *If* women participate in the labour market, they tend to occupy jobs of lower status and income. Women also tend to have less decision-making power or less autonomy, both at the level of households and communities and at the level of states. In many societies, laws do not treat women as equal to men. Cultural beliefs and norms often imply that women are seen as second-rank human beings. The physical integrity of women tends to be more in danger than that of men: women and girls are more vulnerable than men to domestic violence and to rape (UNDP 1995).

However as we have argued above the GDI does not adequately capture the extent of gender inequality. Hence, we wish to explore the possibility of constructing alternatives to the GDI. For the moment, we do not try to measure gender inequality in dimensions related to culture, the socialization of gender identity, autonomy, and power, although these factors are often important underlying causes for socio-economic inequality between men and women. These factors could be integrated at a later stage. They are, however, more difficult to measure.

Our aims are:

- to identify those dimensions and indicators of inequality that are, alone or together, most appropriate to measure socio-economic gender inequality at a certain point in time;
- to classify these indicators according to causal links; and,
- to identify dimensions and variables important to measure socio-economic gender inequality over time.

A complicating factor is, that indicators that are appropriate for measuring the extent of the problem and identifying the causes of the problem at a certain point in time, may not always be relevant for monitoring the effect of policies over time (see also Hanmer *et al.* 1996).

The starting point for our causal framework is the statement that human well-being, and also inequality of well-being, has a *stock* and a *flow* dimension. The difference between the two is that the former is measured in appropriate units, while the latter is measured in appropriate units *per unit of time*. In general, more access to stocks, or *assets* (e.g., land, education, health status), will increase flow aspects of well-being (e.g. income). At the same time, increased flows may lead to larger stocks, but we tend to think that the former is the more important causal relationship. For that reason, we start our discussion of variables by looking for appropriate flow dimensions of well-being, considering them the "dependent variables" in our causal framework.

Dependent variables

Among potential flow variables, income comes to mind first. However, the usual indicator for measuring income has several limitations. In order to establish income inequality by sex, we need to measure *actual disposable income* of men and women. This means, on the one hand, adding income derived from subsistence activities and household tasks, and on the other, subtracting income used for other members of the household (or the network of relatives). Since available statistics generally do not give data on non-market activities and on the intra-household distribution of income, the (formal) income variable has to be complemented by other variables.

It is well-known that there is a large extent of gender inequality in the division of subsistence activities, household tasks and non-paid work in general, and that this inequality is a phenomenon of all societies (ILO 1992, UNDP 1995). The indicator with which this has been established is *time use*. The time used by men and women in different activities seems therefore an important variable for measuring gender inequality in well-being. This is also a flow variable, since we measure time spent per unit of time (a day, or a week).

Case studies in several countries, in particular developing countries, have shown that the intra-household distribution of income and other household resources tends to be uneven. The main dimension in which this could be established are gendered indicators of *health*. Important variables are nutritional status or the intake of food. In low-income societies, food consumption is strongly related to actual disposable income. Nutrients intake, a flow variable, would be a suitable indicator. There is also a strong relation between nutritional status, and thus height, and food consumption (Komlos 1994). The stock variable height can therefore also be used as an indicator, although "normal" differences between men and

women should be taken into account. Differences in nutritional status have been shown to be important to explain the "missing women" in South Asia. Agnihotri (1997) for example states that the decline in the proportion of men to women in the Indian population arises from differential access of women to food, nutrition and health care. Other indicators of health status, such as micronutrient deficencies and vaccination uptake can also be used.

In sum, we think gender inequality at a certain point in time can be measured by the flow variable income, the flow variable time use and health variables such as food intake (flow indicator) or height (stock indicator). These three variables are the dependent variables in the analysis of socio-economic gender inequality. Health indicators are especially important in low-income societies or in low-income strata of the population in rich societies.

Independent variables

In general, we assume that *unequal access to assets* is an important cause for gender inequality in well-being. Assets that are relevant for gender inequality are land, other physical assets such as cattle or domestic utensils or tools, and education. However, we have to expand this in several directions. It is important to take into account unequal access to *all* public services, not only health and education, but also agricultural extension services, welfare services such as unemployment benefits, childcare,[7] housing and public infrastructure.

Some of these assets are available through the market, but others not. Palmer (1995) stressed the importance of male bias in cases where markets are absent, for example, in the public provision of infrastructure and services. New agricultural technology is directed to the work male farmers do, and not to the activities of female farmers, and trunk roads are widened while no roads are built into the hills to connect more households to the market, thereby allowing women to sell their products. In these non-market dimensions, the gender bias is not (only) expressed as discrimination in access to, but we can call it an *inherent bias*. Fahy Bryceson and McCall (1997) give some other examples of inherent biases. In Asia, public space is often synonymous with male space, hence women are unlikely to feel comfortable or able to negogiate access to assets which require entering government offices or banks. Even when new technologies are designed to reduce the drudgery of tasks undertaken by women, they are not necessarily free from male bias. Grain mills, water pumps or community wood lots are often designed to operate on a village or community scale. However, in many cases women would be better served if these technologies were designed for use at the household level, as the time and opportunity costs of using village level resources are high.

In addition to assets, broadly defined as including government services, there are two other

important intermediary variables that influence gender inequality in well-being. These are employment and credit. Here, the market plays an important role, respectively the labour market and the credit market.

Unequal access to assets is a factor causing gender inequality for most assets. This unequal access to assets has not only a quantitative, but also a qualitative component. For example, with respect to access to employment, women tend to be over-represented in lower-paid and lower-status jobs with less career opportunities. In general, where there is a 'dual market' with a 'formal' and an 'informal' segment, women tend to have more access to the goods and services of the lower, informal segment (OECD 1994, Vaiou and Stratigaki 1997). The informal segment of the labour market has less security, and worse primary and secondary labour conditions. A similar phenomenon occurs in financial markets. Women tend to have less access to the formal credit market. They are hence more dependent on informal credit, where quantities are smaller and interest rates higher (Holt and Ribe 1991, Hilhorst and Oppenoorth 1992, UNDP 1995). Furthermore, data show that that in all the major developing regions of the world, on average, boys can expect to spend more years in school than girls (World Bank 1995). Girls and boys sometimes also have unequal access in qualitative terms to a government service like education. Drop-out rates vary by gender world wide and within region (Herz and Khandker 1991).

Finally, it is important to search for causes of the 'unequal access'. Following Krug (1997), we distinguish between a supply and a demand side of discrimination. Providers of goods and services (the supply side of the market) tend to discriminate against women. The causes on the supply side may include discriminating laws, traditions, norms and beliefs in addition to vested interests and differences in power.

On the demand side 'unequal access' is caused by, or accepted out of necessity, due to the high costs involved or barriers to access following from other inequalities. The latter means that women participate in markets starting with less resources, and thus at "unequal terms of participation" (Palmer 1992). For example, lower income and less land ownership reduce the chance of getting credit by lowering the collateral (Holt and Ribe 1991, Hilhorst and Oppenoorth 1992). With respect to high costs, we can distinguish between direct costs, opportunity costs and transaction costs. In some cases, direct costs may be too high, for example, of health services. Opportunity costs are higher for women since women often have a higher responsibility for taking care of children, and for care in general. Palmer (1992) has typed this the "reproductive labour tax" on female participation in the labour market. But it can be applied to other markets, too. These opportunity costs make women less mobile so that their threshold for participating in labour or credit markets is higher. Finally, transaction costs may be important, in particular, exit costs, information costs, search and scrutiny costs involved in searching for a less discriminating employer or husband (Krug 1997). A lack of

information on available financial services has been shown to be a factor in reducing access to credit for women (Holt and Ribe 1991, Hilhorst and Oppenoorth 1992). On the demand side, culture, often transmitted through socialization, may also play a role, as may a lack women's autonomy and/or physical oppression. For example, cultural perceptions about the relative importance of education for boys and girls and the gender division of labour can mean that girls miss more school days than boys (Herz and Khandker 1991).

Tables 5 and 6 summarize the above, separating dimensions of inequality provided through the market (table 6) and non-market dimensions (table 5). In some cases, such as land, both distribution mechanisms may occur. The tables do not explore in detail underlying causes for the inequalities identified, such as laws, culture, socialization or power. It is important to bear in mind that these other factors not only have an impact on supply and demand factors of 'unequal access', but also influence the 'effects', the last column, directly. For example, research has shown that even after controlling for level of the job, education and experience, a gendered income gap persists.[8] And women earn less than men even in the same job, or if they perform work of equal value (De Bruijn 1997). Culture, and in particular gender identities influence inequality in all dimensions and in all indicators. Although these causes are less suitable for policy intervention, there is some evidence that changing socio-economic variables may lead to changing gender identities (Wheelock 1990) although no change is sometimes also an outcome (Hochschild 1989).

Now we want to raise the question whether we can use the same indicators for measuring inequality over time, i.e., for monitoring the effects of policies. As concluded in a recent study on the measurement of poverty (Hanmer *et al.* 1996), for assessing socio-economic well-being over time *assets* are important. For measuring gender inequality, we can say that if inequality is to be reduced over time, increased relative *flows* should lead to increased relative *assets* holdings. It seems to be appropriate, therefore, to add land, physical assets, monetary savings, and the human capital asset education to the already identified (dependent) variables income, health and time use.

Table 5. Gender inequality in non-market dimensions

Dimension	Inherent male bias	Access to: quantity	Access to: quality	Supply factors	Demand factors	Consequences
Technology	Yes	Yes		Extension by men	Opportunity costs: time	Lower income Less time saving Less health
Housing, other infrastructure	Yes	Yes (safety reasons)			costs	Lower income Less time saving Less health
Health services	Yes	Yes	Yes	tradition	costs, time	Less health Lower income
Education	Yes	Yes	Yes	tradition	costs, time	Lower income Less health
Other state services	Yes	Yes	Yes	laws		Lower income Less health
Land and natural resources		Yes	Yes	laws		Lower income Less time saving Less health
Other physical assets		Yes	Yes	laws		Lower income Less time saving Less health

Table 6. Gender inequality in market dimensions

Dimension	Access to: quantity	Access to: quality	Supply factors	Demand factors: opportunity costs	Consequences
Employment	Yes	Yes: more informal labour, worse labour conditions, segregation	Discrimination	Lack of childcare, lack of mobility	Lower income
Credit	Yes	Informal credit market, higher interest rate	Discrimination, lack of collateral	Less time to fulfill requirements	Lower income

Our relationships in the literature

After constructing this causal scheme in which inherent gender bias to assets and access to assets are related to the indicators of well-being income, time and health, we carried out a brief literature search in order to examine to what extent the relationships between variables of socio-economic welfare have been investigated empirically. We only included studies dealing with a relationship between gender inequality in one variable and inequality in another, and only studies where the relationship investigated was clear from title and/or abstract.[9] In a total of 16 studies in which relationships between gendered indicators are examined, 22 relationships received attention (see table 7).

Table 7. Relationships between gendered variables as found in literature search

Relationships within and among our 'dependent variables':

- Impact of child health indicators on mortality	1
- Impact of income (and assets) on health:	6
- Impact of income and assets on time use:	1

Relationships between our independent and dependent variables:

- Impact of education (human capital) on income:	3
- Impact of education on health:	4
- Impact of access to land or of natural resources on income:	2
- Impact of credit on health:	1
- Impact of public (or factory level) health services on health:	2
- Impact of use of health services on health:	1
- Impact of education services on skills	1

In addition, four studies deal with relationships between cultural factors and/or autonomy, and well-being in general, or sometimes health indicators in particular. There were no studies examining the impact of our dependent variables on our independent variables. The full overview of these studies with complete references can be found in the annex.

We conclude from this brief overview, that our 'dependent' variables income and health are indeed often seen as dependent variables in this survey of empirical studies. However, 'time use' is studied relatively little as dependent variable. In fact, there are studies focusing on time use in itself: case studies highlighting the 'invisible role of women', and more abstract studies on how to take unpaid work into account in national economic statistics (Bruyn-Hundt 1996, Pyatt 1994, Waring 1988). We think that there are good reasons for considering the sexual division of, for example, leisure and sleep as valuable indicators of socio-economic well-being in itself.

Conclusion

As a preliminary conclusion, we think that our three dependent variables, taken together, do make for a valid measurement of socio-economic gender inequality at a certain point in time, and that our classification of independent variables constitutes a relevant scheme for searching causal links, and may be helpful in identifying policies for reducing gender inequality.

4. SUMMARY AND CONCLUSION

It is important that gender inequality is measured in all countries. Such an index of gender inequality has both practical and theoretical relevance. First, governments that become aware of, and are publicly known for a lack of gender equity in their country, are more likely to carry out policies to reduce this inequality. Secondly, there is also a theoretical interest in establishing such a measure of gender inequality. By doing so, the relationship between gender inequality and general welfare can be examined.

UNDP's *1995 Human Development Report* has set an important step towards developing such measures of gender inequality, constructing and publishing a GDI (Gender-Related Development Index) and a GEM (Gender Empowerment Measure). In this paper we concentrated on socio-economic gender equality, and we examined the relevance and validity of UNDP's GDI. First we described how this GDI is constructed. The GDI uses the same variables and indicators as the Human Development Index (HDI), income, life expectancy and a combined indicator for education (literacy rates plus combined primary, secondary and tertiary enrolment rates). Societies are assumed to have a preference for equality, which means they give a higher **weight** to achievements of the group with lower scores (mostly females) than to the group with the higher scores. In the GDI, countries are therefore ranked both according to their absolute level of human development, and according to their extent of gender equity.

Several countries have a different rank according to the GDI if compared to their rank according to the HDI. We showed that increasing the equality preference to its highest value (so that only improvements in female scores matter), leads to a decrease in the GDI score of between 15 and 20 points for Benin, Costa Rica and The Netherlands. However, we also showed that there is a strong statistical correlation between the countries' GDI score and their income per capita. This illustrates serious limitations of the GDI for measuring gender inequality.

In our view, developing a measure of socio-economic gender inequality has three aims: to identify the extent of inequality at a certain point in time, to identify causes for inequality with a view to suggesting policies to reduce inequality, and to monitor the impact of these policies over time. In view of these aims, we showed that UNDP's GDI has the following limitations.

First, such a measure should aim at measuring gender inequality or equality in itself. It should not take absolute measures of well-being into account. Secondly, the variables and indicators used for constructing the GDI are not very appropriate. Even if we assume that the three variables used are most relevant for measuring human development, the concrete indicators and the way they have been measured do not capture important aspects of gender inequality. Thirdly, the GDI only focuses on measuring inequality at a certain point in time. It does not give attention to possible causal relations in socio-economic gender inequality, which could lead to useful policy suggestions. This reduces the policy relevance of the GDI.

In the last section of this paper, we developed a conceptual framework for measuring socio-economic gender equality. The framework is based on the notion that well-being at a certain point in time can be measured by (mainly) flow variables, but that stock variables are the determinants of this well-being. As dependent variables in this framework we identified income, time use and health, and as independent variables both assets (technology, infrastructure, housing, land, other natural resources, other physical assets, credit, employment) and services (education, health services, and other state services). Unequal access to assets and services may cause inequality in well-being. In addition, assets and services may have an inherent gender bias, in particular, of not supplied through the market. Digging further into the causes for unequal access to assets, we distinguished a supply and a demand side. Factors causing unequal access may be both of a socio-economic nature or of a cultural, physical or political nature.

Notes

1. This paper was prepared for the Workshop on GDI/GEM Indicators held at the Institute of Social Studies in The Hague, 13-17 January 1997. The authors would like to thank the participants of the Workshop, and in particular Janneke Plantenga and Graham Pyatt for useful comments.

2. The following section draws heavily on Anand and Sen (1995: 4-7).

3. The total wage bill is:

$WL = W_fL_f + W_mL_m$

Where W stand for wages, and L for employment. The subscript f stands for female and the subscript m for male. We can calculate the share of wages (income) going to women by dividing both sides by W*L:

$1 = W_f/W * L_f/L + W_m/W * L_m/L$

The first term on the right hand side is the female share in total income.

If $W_f = W_m = W$ then

$1 \cong L_f/L + L_m/L$.

4. For any component of the HDI the calculation is

$$Index = \frac{Actual\ x_i\ value - minumum\ x_i\ value}{Maximum\ x_i\ value - minimum\ x_i\ value}$$

5. Myanmar, Viet Nam and Georgia are outliers and good performers, Benin, Senegal and Guinea are outliers and bad performers.

6. See, for example, Elson 1995, Deere 1995, and Gassmann 1995.

7. With respect to childcare, the relevant indicator is not unequal access, but the relative attention for childcare provisions in public and private sector policies, compared to attention for other services.

8. For the Netherlands, see for example a recent study by Bartels and De Groot (1996). Their study of firms in commercial services concludes that women are paid less, even taking into account also the eventual higher costs involved in hiring women (higher turnover, childcare for example).

9. We used the CD-rom database of the Journal of Economic Literature (ECONLIT), searching for 'indicators' with 'gender', 'indicators' with 'women', 'human development' with 'gender' and 'human development' with 'women'. The latter was so large, however, that we stopped after about 200 items. See annex.

REFERENCES

Agnihotri, Satish B. (1997). "Workforce Participation, Kinship and Sex Ratio Variations in India", *Gender, Technology and Development,* Vol 1, No. 1, (January-April), pp. 75-111.

Anand, Sudhir and Amartya Sen (1995). "Gender inequality and human development: Theories and measurement". Background Papers for Human Development Report 1995. Mimeo, UN Human Development Report Office, August.

Bartels, C.P.A and T. de Groot (1996). "Economische prestaties van mannen en vrouwen" in *Economisch Statistische Berichten*, Vol. 81 No. 4075, 2 October, pp. 808-812.

Bruijn, Jeanne de (1997). "Comparable worth and equal pay policies in the European Union", in A. Geske Dijkstra and Janneke Plantenga, eds. *Gender and Economics: A European Perspective*. London: Routledge, pp. 153-162.

Bruyn-Hundt, M. (1996). *The Economics of Unpaid Work*. Amsterdam: Thesis Publishers.

Deere, Carmen Diana (1995). "What difference does gender make? Rethinking peasant studies" *Feminist Economics* 1 (1), Spring, pp. 53-72.

Elson, Diane (1995). "Male bias in macro-economics: the case of structural adjustment", in Diane Elson, ed. *Male Bias in the Development Process*. 2d edition. Manchester: Manchester University Press.

Fahy Bryceson, Deborah and Michael K. McCall "Lightening the Load on Rural Women: How Appropriate is the Technology Directed Towards Africa?" *Gender, Technology and Development,* Vol 1, No. 1, (January-April), pp. 23-45.

Gassmann, Franziska (1994). "Costs of Discrimination; Part I: Developing Countries, Part II: Industrialized Countries". Background Papers for Human Development Report 1995. Mimeo, UN Human Development Report Office, December.

Hanmer, Lucia, Graham Pyatt and Howard White, assisted by Nicky Pouw (1996). "Poverty in Sub-Saharan Africa: What can we learn from the World Bank's Poverty Assessments?" Mimeo. Institute of Social Studies, The Hague.

Herz, Barbara and Shahidur Khandker (1991). "Women's Work Education and Family Welfare in Peru" *World Bank Discussion Paper,* 116. Washington: World Bank.

Hilhorst, Thea and Harry Oppenoorth (1991). *Financing Women's Enterprises* Amsterdam: Royal Topical Institute.

Hochschild, A. (with Anne Machung) (1989). *The Second Shift. Working Parents and the Revolution at Home.* New York: Viking.

Holt, Sharon and Helena Ribe (1991). "Developing Financial Institutions for the Poor and Reducing Barriers to Access for Women", *World Bank Discussion Paper,* 133. Washington: World Bank.

ILO (1992). *World Labour Report 1992*. Geneva: ILO.

Komlos, John (1994). "On the Significance of Anthropometric History", *Rivista di Storia Economica* 11 (1), February, pp. 97-109.

Krug, Barbara (1997). "Discrimination against Women: A Neo-institutionalist Perspective",

in A. Geske Dijkstra and Janneke Plantenga, eds. *Gender and Economics: A European Perspective*. London: Routledge, pp. 54-72.

OECD (1994). *Women and Structural Change, New Perspectives*. Paris.

Palmer (1992). "Gender equity and economic eficiency in adjustment programmes", in H. Afshar and C. Dennis, eds. *Women and Adjustment in the Third World*. Basingstoke: MacMillan, pp. 69-86.

Palmer, Ingrid (1995). "Public finance from a gender perspective", in *World Development* 23, No. 11, pp. 1981-1986.

Pyatt, Graham (1992). "There is nothing wrong with the HDI, but ...", Paper presented to the 22d General Conference of the International Association for Research in Income and Wealth, Flims, Switzerland, 30 August - 5 September.

Pyatt, Graham (1994). "The use of time and the contribution of women to GDP", Paper presented at Development Economics Seminar 1994-3, The Hague, 3 June.

UNDP (1995). *Human Development Report 1995*. New York: Oxford University Press.

Vaiou, Dina and Maria Stratigaki (1997). "Women in the South: Diverse experiences of work in a unifying Europe", in A. Geske Dijkstra and Janneke Plantenga, eds. *Gender and Economics: A European Perspective*. London: Routledge, pp. 104-117.

Waring, M.J. (1988). *If Women Counted: A Feminist Economics*. New York/San Francisco: Harper.

Wheelock, Jane (1990). *Husbands at Home: The Domestic Economy in a Post-Industrial Society*. London/New York: Routledge.

World Bank (1995). *Towards Gender Equity* Washington: World Bank

Zhangmo, Zeten and Maina Kharga (1997). "Country Paper: Bhutan" in Saskia E. Wieringa, ed. *Workshop on GDI/GEM Indicators*, The Hague, 13-18th January.

ANNEX 1. Sources for data used in UNDP 1995

Indicator	*Source*
Income:	
- Female share in earned income (wages in formal sector, multiplied by share of women in employment)	UN 1994a, ILO 1994, World Bank 1992, UN 1994k and UN 1995
Time use	
- Case studies in 31 countries (our 4 countries not included)	UNDP commissioned UNDP (1995:ch.4)
Health	
- Female life expectancy at birth	UN 1994c
- index 1970 is 100	UN 1994c
- Maternal mortality rate	UNICEF 1995 (WHO)
- index 1970 is 100 (Benin not)	UNICEF 1995
- Women using contraception (Benin not)	UN 1994b
- Total fertility rate	UN 1994c
- index 1970=100	UNDP 1995
- Fertility rate, age 15-19 (not Benin)	UN 1994a
Education	
Access to: quantity	
- Female literacy rates	UN 1994a
- index 1970=100 (not Benin)	UN 1994a
- f as % of m	UN 1994a
- P, S and T. enrolment rates, f as % of male	UN 1994a
- index 1970=100	UN 1994a
- Female combined enrolment ratio	UNESCO 1994
Employment	
Quantity:	
- Female economic activity rate	UN 1995/ILO
- f as % of male	UNDP
Quality:	
(not Benin)	
- Administrative and managerial, f as % of m	UN 1994a/ILO
- Index 1970=100	UN 1994a/ILO
- Professional and technical, f as % of m	UN 1994a/ILO
- index 1970=100	UN 1994a/ILO
- Clerical and sale, f as % of m	UN 1994a/ILO
- index 1970=100	UN 1994a/ILO
- Services, f as % of m	UN 1994a/ILO
- index 1970=100	UN 1994a/ILO

ANNEX 2. Results of Econlit Search

Search:
- *indicators* with *gender*
- *indicators* with *women*
- *human development* with *gender*
- *human development* with *women* (search not completed)

Impact of health indicators on other health indicators:
- Relation of health indicators with child mortality (Hill and Upchurch 1995)

Impact of income (and assets) on health:
- Income and use of health services in households (Heinonen 1994)
- Income and health (height) as indicators of welfare (Komlos 1994)
- Effect of income, assets and prices on fertility (Khandker 1985)
- Effect of status of women on the birth rate (Pattanaik 1995)
- Models of nutrients intake in the household (Behrman 1992)
- Impact of assets on health investment in children (Duraisamy and Duraisamy 1995)

Impact of income and assets on time use
- Effect of income, assets and prices on time use (Khandker 1985)

Impact of education on income, etc.
- Human capital and earnings (Lee and Nagaraj 1995)
- Education and well-being (Hill and King 1995)
- Social gains of female education (Subbarao and Raney 1995)

Impact of education on health:
- Parental education and child health (Thomas 1991)
- Effect of education on fertility (Khandker 1985)
- Effect of education on fertility (India, Vlassoff 1992)
- Impact of education on health investment in children (Duraisamy and Duraisamy 1995)

Effect of access to land and natural resources on income
- Natural resources and poverty (Agarwal 1992)
- Command over property and income and other indicators (Agarwal 1994)

Impact of credit on health
- Impact of credit on empowerment, fertility, contraceptive use, fertility desire (Amin, Hill and Li 1995)

Impact of health (or factory level health) services on health
- Impact of health services on health investment in children (Duraisamy, Duraisamy 1995)
- Impact of workplace health education and simple health services, on health (White 1990)
- Use of health services and infant and child mortality (Hill and Upchurch 1995)

Impact of education services on skills
- Availability of schools and gender gap in skills (Alderman *et al.* 1996)

Relation with cultural factors, autonomy

- Importance of culture (norms) for well-being (Basu 1992)
- Marriage "distance" and autonomy, autonomy and fertility (Vlassoff 1992)
- Impact of autonomy on fertility (Morgan and Niraula 1995)
- Impact of credit to women on actual control over credit (autonomy) (Goetz and Gupta 1996)

REFERENCES TO ANNEXES

Agarwal, Bina (1992). "Rural Women, Poverty and Natural Resources: Sustenance, Sustainability and Struggle for Change" in Harriss, Barbara, Guhan, S., Cassen, R.H., eds. *Poverty in India: Research and Policy*. Delhi, Oxford, New York and Toronto: Oxford University Press, pp. 390-432.

Agarwal, Bina (1994). "Gender and Command over Property: A Critical Gap in Economic Analysis and Policy in South Asia" *World Development* 22 (10), October, pp. 1455-78.

Alderman, Harold, Jere R. Behrman, David R. Ross, and Richard Sabot (1996). "Decomposing the Gender Gap in Cognitive Skills in a Poor Rural Economy" *Journal of Human Resources*. 31 (1), Winter, pp. 229-54.

Amin, Ruhul, Hill, Robert B., Li, Yiping (1995). "Poor Women's Participation in Credit-Based Self-Employment: The Impact on Their Empowerment, Fertility, Contraceptive Use, and Fertility Desire in Rural Bangladesh", *Pakistan Development Review* 34 (2) Summer, pp. 93-119.

Basu, Alaka Malwade (1992). "The Status of Women and the Quality of Life among the Poor" *Cambridge Journal of Economics* 16 (3) September, pp. 249-67.

Behrman, Jere R. (1992). "Intra-household Allocation of Nutrients and Gender Effects: A Survey of Structural and Reduced-Form Estimates" in Osmani, S.R., ed. *Nutrition and Poverty*. World Institute for Development Economics Research Studies in Development Economics. Oxford, New York, Toronto and Melbourne: Oxford University Press, Clarendon Press, pp. 287-320.

Duraisamy, P., Duraisamy, Malathy (1995). "Determinants of Investment in Health of Boys and Girls: Evidence from Rural Households of Tamil Nadu, India", *Indian Economic Review* 30 (1), January-June, pp. 51-68.

Goetz, Ann-Marie, Gupta, Rina Sen (1996). "Who Takes the Credit? Gender, Power, and Control over Loan Use in Rural Credit Programs in Bangladesh", *World Development* 24 (1) January, pp. 45-63.

Heinonen, Tuula (1994). "Gender and the Use of Health Care Services in Rural Philippines", *Canadian Journal of Development Studies* 15 (3), pp. 445-59.

Hill, M. Anne, and King, Elizabeth M. (1995). "Women's Education and Economic Well-Being", *Feminist Economics* 1 (2), Summer, pp. 21-46.

Hill, Kenneth, Upchurch, Dawn M. (1995). "Gender Differences in Child Health: Evidence from the Demographic and Health Surveys", *Population and Development Review* 21 (1) March, pp. 127-51.

ILO (1994), *World Labour Report 1994*. Geneva.

Khandker, Shahidur Rahman (1985). "Women's role in household productive activities and fertility in Bangladesh", Yale Economic Growth Center Discussion Paper: 488, July 8, pp. 35.

Komlos, John (1994). "On the Significance of Anthropometric History", *Rivista di Storia Economica* 11 (1), February, pp. 97-109.
Lee, Kiong Hock, and Nagaraj, Shyamala (1995). "Male-Female Earnings Differentials in Malaysia", *Journal of Development Studies* 31 (3), February, pp. 467-80.
Morgan, S.Philip, Niraula, Bhanu B. (1995). "Gender Inequality and Fertility in Two Nepali Villages", *Population and Development Review* 21 (3), September, pp. 541-61.
Pattanaik, B.K. (1995). Status of Women, Infant Mortality and Birth Rate: A Correlative Study, *Indian Economic Journal* 42 (4), April-June, pp. 116-21.
Subbarao, K., Raney, Laura (1995). "Social Gains from Female Education: A Cross-National Study", *Economic Development and Cultural Change* 44 (1), October, pp. 105-28.
Thomas, Duncan (1991). "Like Father, Like Son: Gender Differences in Household Resource Allocations" Yale Economic Growth Center Discussion Paper No. 619, January.
UN (1994b). *Equality in Economic Decision-Making*. Report of the Secretary-General Commission on the Status of Women. Thirty-Ninth Sessio. 23 December. New York.
UN (1994a). "Women's indicators and statistics database". Version 3. CD-ROM. Statistical Division. New York.
UN (1994b). *World Contraceptive Use 1994*. Population Division. New York. ST/ESA/SER.A/143. E.94. XIII.15.
UN (1994c). "World Population Prospects Database 1950-2050". 1994 Revision. Population Division. New York.
UN (1995). *The World's Women 1970-1995: Trends and Statistics*. New York.
UNESCO (1994). Correspondence on combined primary, secondary and tertiary Enrolment. Division of Statistics, Section for the Development of Statistical Services. 27 December. Paris.
UNICEF (1995). *The State of the World's Children 1995*. New York: Oxford University Press.
Vlassoff, Carol (1992). "Progress and Stagnation: Changes in Fertility and Women's Position in an Indian Village", *Population Studies* 46 (2), July, pp. 195-212.
White, Mary C. (1990). "Improving the Welfare of Women Factory Workers: Lessons from Indonesia", *International Labour Review* 129 (1), pp. 121-33.
World Bank (1992). *World Development Report 1992: Development and the Environment*. New York: Oxford University Press.